

# ADVANCED LABORATORY — PHYX 3880

## Spring 2016

### SYLLABUS

**Class:** 11:30 – 2:20 MW SER 109, 132 & 138  
[canvas.usu.edu](http://canvas.usu.edu) & [www.physics.usu.edu](http://www.physics.usu.edu).  
(For access to labs outside of class time, see the receptionist in SER 250 for keys or see James Coburn for ID access code).

**Instructor:** Vincent Wickwar, Physics Dept. & CASS SER 218E 435-512-1124  
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**Office Hours:** During lab time or by appointment.

**Prerequisites:** *General Physics* (PHYX 2210 and 2220), *Introduction to Modern Physics* (PHYX 2710), *Introduction to Computer Methods in Physics* (PHYX 2500), and *Intermediate Lab I* (PHYX 3870). **Students will not be admitted without the prerequisites without permission from the instructor.**

**Objectives:** This course is intended to address all five goals for physics laboratory courses identified in the *AAPT Goals of the Introductory Physics Laboratory*. See the heading **AAPT**. During this semester, particular emphasis is placed on: (1) experimental and analytic skills including experimental techniques, computer interfacing, data analysis, and error analysis; (2) developing collaborative learning skills through work with a lab partner; and (3) written and oral communication skills.

**Lab Notebook:** **A BOUND LAB NOTEBOOK IS REQUIRED.** All data, notes, thoughts, scratch work, calculations, photographs, and results from computer calculations are to be kept in the notebook. **NO LAB REPORT WILL BE ACCEPTED UNLESS THE EXPERIMENT IS PROPERLY RECORDED IN THE LAB NOTEBOOK.**

**Texts:**

- John R. Taylor, *An Introduction to Error Analysis*, 2<sup>nd</sup> ed. (University Science Books, Mill Valley, CA, 1997). **REQUIRED** (Should have it from Phyx 3870.)
- AIP Style Manual, 4<sup>th</sup> ed. (Am. Institute of Physics, New York, 1990). Available at [AIP website](#).
- Additional references from Phyx 3870 are listed under the heading **Annotated Bibliography**.

- Software:**
- *MathCAD* Version 14, (Mathsoft, Cambridge, MA, 2003). Available in SER 109 and SER 231 (see receptionist in SER 250 for access). Was used in Phyx 2500.
  - However, you may use other software, e.g., Mathematica, Maple, IDL, MatLab, Python, C++, Fortran.

**Assignments:** There are three experiments to be completed and the related reports made. The experiments should be performed by pairs of students and the written reports put together separately by each student. Experiments 1 & 3 are on the topics of your choice found under the heading **List of Experiments**. The experiments are designed to take about six to eight hours each for data collection.

**Experiment 1** requires a draft and a final lab report. It requires a final, full lab report.

**Experiment 3** requires a final, full lab report.

**Experiment 2** is an Extended Investigation. It requires a draft and final proposal. It also requires a draft and a final lab report. AND, it requires a joint oral report. Details are provided under the heading **Extended Investigations**.

Headings are given for the format of lab reports and for what will be looked for in the grading. Note that the suggested format is very similar to the format of most published articles. As a reminder, a heading is given for an error analysis glossary.

Students are encouraged to present (not required, but there is extra credit) interesting results from the Extended Investigation at the [Student Showcase](#) on Thursday, 14 April. (Application deadline is Monday, 15 February 2016.)

**Grading:** Lab reports for Experiments 1 & 3 will each count 25% of the total grade. The proposal, report, and oral presentation for Experiment 2, the Extended Investigation, will count 50% of the total grade.

Draft lab reports and lab manuals must be turned in at the beginning of class on Wednesday, 3 February and Monday, 4 April. Students are to revise the lab reports for Experiment 1 and for the Extended Investigation based on instructor comments, and submit the revised versions for final evaluation two weeks later, Wednesday, 17 February; Monday, 18 April. The final report for Experiment 3 is due Wednesday, 27 April 2016.

*There will be a one third letter grade penalty for each class period the report is late. Grades may also be reduced if the lab and equipment is not left clean and orderly.*

Headings also are given for the formats lab reports are to follow and how the reports will be graded.

Again, students are encouraged to present interesting results from the Extended Investigation at the [Student Showcase](#) for extra credit. Follow the link for information and instructions about posters and presentations.

**Timing:** The timing of everything is fairly involved. To see it laid out in detail, go to the heading **Significant and Critical Dates**.

**Lab Partners & Experiments:** Lab partner selections and experiment selections should be made in consultation with the instructor on the first day of class. It is strongly encouraged that lab partners change from one experiment to the next. The final selections will then be posted. Each pair of students must have a written plan for the Extended Investigation. The draft is due 1 week before the beginning of the experiment. The final plan is due a week after the beginning of the experiment.

**Breaking News:** Occasionally, additional class news items will be posted on Canvas.

**Disability Resource Center:** Students with ADA-Documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn. (435) 797-2444 voice, (435) 797-0740 TTY, (435) 797-2444 VP, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

**Honor Code:** The honor code will be strictly enforced in this course. Any suspected violations of the honor code will be promptly reported to the honor system. For more information please visit: <http://www.usu.edu/policies/PDF/Acad-Integrity.pdf>

**Class Fee:** A \$40 fee per semester is charged for this class to help cover the expenses for expendable supplies and computer usage. Please be aware that the equipment used in this lab was acquired over many years, at a cost well in excess of \$100,000; **please treat the equipment with appropriate care and respect.**